Effects of Fermenten™ on Holstein Dairy Calf Growth Rate from Birth to Weaning

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ABSTRACT

The effective rapid growth of healthy, young dairy calves is imperative to the success of the dairy industry because it can decrease the cost of raising replacement heifers and therefore reduce age at first calving. Fermenten™ (Church and Dwight, Inc., Princeton, NJ) was evaluated as a dairy calf feed supplement. It is an organic complex of amino acids, peptides, and non-protein nitrogen for the purpose of stimulating microbial growth in the gastrointestinal tract, potentially stimulating rumen microbe development, and thus increasing feed efficiency for faster growth. The study was performed on a dairy calf ranch in northeast Wisconsin during the 2016 summer. The farm has an estimated 5,000 hutch calves that are collected daily from 30 contracted farms within a 60 mile radius according to contract terms. In this study, 390 Holstein calves completed a trial from birth to weaning in which there were two treatment groups: one control (no Fermenten™) and one treated group fed Fermenten™. Calves were randomly assigned to the treatment groups as they entered the farm over a 10 day period. Calves were given free choice water and grain throughout the trial. In general, calves were weaned based on age and weight, being reduced to half milk for one week. Pasteurized whole milk was fortified as needed with milk replacer and fed to calves twice daily (2 L per feeding). Serum protein concentrations were similar ($P = 0.23$) for the control and Fermenten™ groups (5.89 and 5.72 g/dL, respectively). Control calves were weaned at 56.8 days and the Fermenten™ calves were weaned at 54.7 days ($P < 0.01$). Average daily gain was higher for control calves that those fed Fermenten™ (0.685 and 0.613 kg/day, respectively; $P < 0.01$). The results of this trial did not indicate the desired benefit from feeding Fermenten™ to pre-weaned dairy calves.

INTRODUCTION

The primary purpose of the dairy industry is to raise healthy cattle to produce milk. Replacement heifer growing and management is a significant part of the process. The effective rapid growth of healthy, young dairy calves is imperative to the success of the dairy industry because it can decrease the cost of raising replacement heifers and therefore reduce age at first calving. A heifer that reaches breeding weight sooner has the possibility of earlier breeding, and consequently, sooner calving. This creates the potential for a more profitable productive life of an animal. In this study, Fermenten™ (Church and Dwight, Inc., Princeton, NJ) was evaluated as a pre-weaned dairy calf feed supplement. Fermenten™ is an organic complex of amino acids, peptides, and non-protein nitrogen for the purpose of stimulating microbial growth in the gastrointestinal tract, potentially stimulating rumen microbe development, and thus increasing feed efficiency for faster growth. The objective of this study was to compare the average daily gain of treated calves versus non-treated calves to determine if feeding Fermenten™ is an effective way to increase growth rate of replacement heifers prior to weaning and consequently reach breeding weight sooner. The null hypothesis of this study is that there would be no difference in average daily gain between Fermenten™ treated calves and control calves. Therefore, the objectives of this project were to accept or reject the null hypothesis by determining if calves supplemented with Fermenten™ would outperform those fed conventional calf starter grain or vice versa.

In previous studies, Fermenten™ has been assessed for lactating dairy cows and pre-pubertal heifers. In a study by Lean et al. (2005), Fermenten™ was found to increase microbial N production and nutrient digestibility while also increasing the acetate to propionate ratio in vitro. In a study by Penner et al. (2009), it was determined that feeding Fermenten™ to lactating

Holstein dairy cows (163 ± 55 days in milk, mean ± standard deviation) did not affect ruminal pH but did result in higher numerical milk yields, crude protein, and milk fat, although only the milk fat was statistically significant ($P < 0.01$). This study ultimately concluded that a combination of Fermenten™ and supplemented sucrose "do not improve the efficiency of nutrient utilization" as previously hypothesized by Lean et al. (2005).

MATERIALS & METHODS

The study was performed on a large dairy calf ranch in northeast Wisconsin during the summer of 2016. The farm has an estimated 5,000 hutch calves that are collected daily from 30 contracted farms within a 60 mile radius according to contract terms. Two veterinarians from Arm & Hammer Animal Nutrition and two representatives from Vita Plus (Arlington, WI) formulated and oversaw the project while the two summer interns hired by Hall's Calf Ranch executed the trial on-farm. Tasks included assigning calves to treatment groups, daily feeding of the Fermenten™-treated group, and compiling calf data from HeiferPRO (ProfitSource LLC., Merrill, WI), such as date of birth, initial weight, blood serum protein concentrations, and treatment records.

Study Design

The study of the effects of Fermenten™ on growth rate of pre-weaned calves was completed as a field trial in which two treatments groups: one control (not fed starter grain supplemented with Fermenten™) and one treated group (fed starter grain supplemented with Fermenten™ at 2% of dry matter). Calves were allocated to two treatment groups as they entered the farm at 1 to 2 days old over a 10 day period and a total of 390 Holstein calves completed the

trial from birth to weaning. Calves were housed in 4 long rows of hutches with the first row assigned a control group, the second row assigned a Fermenten™-fed group, the third row assigned a control group, and the fourth row assigned a Fermenten™-fed group. Calves were given free choice water and grain throughout the trial and were fed pasteurized whole milk fortified as needed with milk replacer twice daily (2 L per feeding). Grain was provided *ad libitum* and individual intake was not recorded. In general, calves were weaned based on age (approximately 60 days), estimated weight, and estimated adequacy of grain intake. The farm manager was responsible for deciding when to wean calves based on these stated parameters. The calves were reduced to half milk for one week prior to complete weaning. Health incidences were recorded when animals were treated at least once by one of three trained treaters on the farm. Treaters visually observed every calf at least once per day.

Data was compiled from HeiferPRO into an Excel file at the completion of the project. The data were analyzed using the Statistical Analysis Software (SAS, Cary, NC). The performance data were analyzed as a completed randomized model using PROC GLM, including the effects of treatment, sex, and their interaction. The heath data were analyzed using Chi-square.

RESULTS

As shown in Table 1, serum protein concentrations were similar ($P = 0.23$) between the control and Fermenten™ groups (5.89 and 5.72 g/dL, respectively). “Serum total protein concentration is correlated with sIgG concentration; an sTP measurement ≥ 5.2 g/dL is considered to be indicative of adequate passive transfer of immunity in clinically normal hydrated calves” (Poulsen et al., 2010). This data proves that the results between control and

treated calves were not influenced by a significant difference in initial serum protein or failure of passive transfer. Also shown in Table 1, control calves were weaned at 56.8 days and the Fermenten™ calves were weaned at 54.7 days ($P < 0.01$). The Fermenten™ calves were weaned 2.1 days sooner than control calves. This may have resulted from the farm manager noting a higher apparent grain intake by the Fermented™-fed calves, despite an overall lower average daily gain. Average daily gain was higher for control calves than those fed Fermenten™ (0.685 and 0.613 kg/day, respectively; $P < 0.01$) (Table 1). Control calves gained an average of 0.072 kg more per day than the Fermenten™ calves (Figure 1).

Scours, respiratory illness, and navel illness data were collected to determine if health incidences had a significant impact on the different growth rates of the control and Fermenten™ calves. As seen in Table 2, control calves had an 18.6% occurrence of scours while Fermenten™ calves had a 17.0% occurrence ($P = 0.68$). Control calves had a 36.2% occurrence of respiratory disease while Fermenten™ calves had a 35.1% occurrence ($P = 0.82$). Control calves had a 2.51% incidence of navel illness while Fermenten™ calves had an incidence rate of 2.58% ($P = 0.97$). The percentages of scours, respiratory disease, and navel illnesses between calves in the control group and Fermenten™ group were not significantly different, proving that health factors did not cause the difference between the two groups' average daily gain. However, in a calf study performed by the United States Department of Agriculture National Animal Health Monitoring System (USDA-NAHMS) (2014), an average of 19% of all calves experienced digestive problems, such as scours, and 11% experienced respiratory problems, such as pneumonia. Both the control calves and the Fermenten™ calves on this trial were close to the average for scours but had much higher treatment percentage for respiratory disease. This is a factor that may have affected the average daily gain of both groups of calves.

Table 1. Serum protein, weaning age, and average daily gain (ADG) for control and Fermenten™-fed groups.

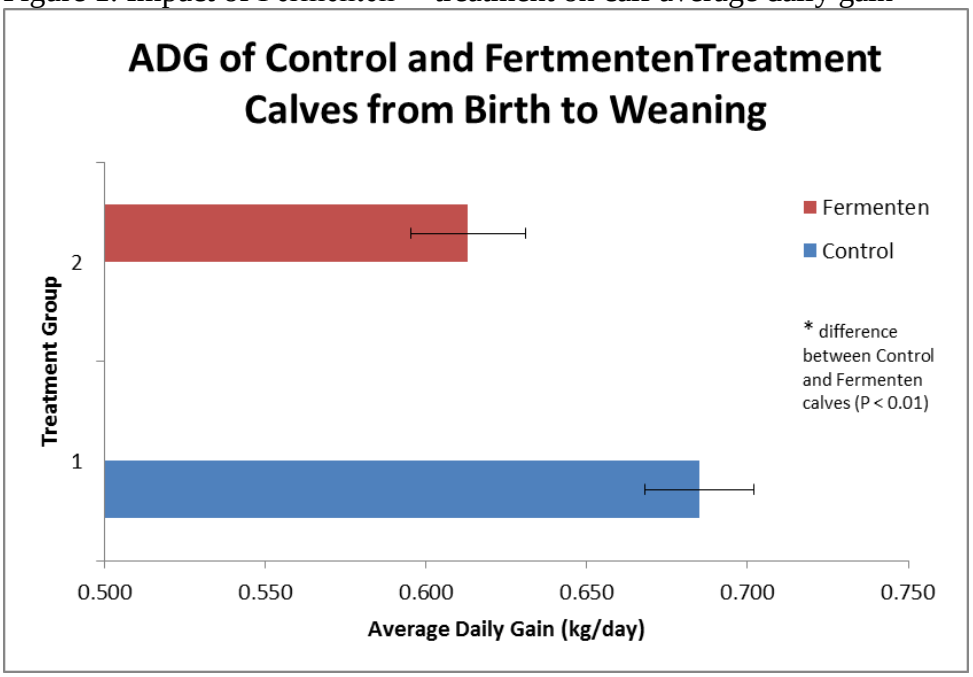
	Control	Fermenten	SE
Serum Protein (g/dL)	5.87	5.72	0.15
Weaning Age (days)	56.8[a]	54.7[b]	0.5
ADG (kg/day)	0.685[a]	0.613[b]	0.018

[ab]Means with dissimilar superscripts differ (P < 0.01)

Table 2. Health data for calves fed control or Fermenten™

Health Data		
	Control	Fermenten
Scours (%)	18.6	17.0
Respiratory illness (%)	36.2	35.1
Navel infection (%)	2.51	2.58

Figure 1. Impact of Fermenten™ treatment on calf average daily gain



CONCLUSIONS

The results of this trial suggest that while, according to Church & Dwight Co. Inc Fermenten™ is effective for increasing milk production in lactating cows, it may not be effective in increasing growth rate in heifers from birth to weaning. We rejected the null hypothesis. The

overall results did not indicate the desired benefit from feeding Fermenten™ to pre-weaned dairy calves.

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